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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/053,704	01/24/2002	Tomoyuki Hattori	218296US2S CONT	7926

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EXAMINER

NGUYEN, HANH N

ART UNIT PAPER NUMBER

2834

DATE MAILED: 02/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/053,704

Applicant(s)

HATTORI ET AL.

Examiner

Nguyen N Hanh

Art Unit

2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 November 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Remarks

1. In view of amendment, the Examiner withdraws the objections to the drawings and the specification. The Applicant has mentioned that claim 10 has been amended to recite that the stator satisfies the claimed relationship. However, the rotor was recited instead of the stator in the amended claim 10.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 10 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 10 recites the limitation "the rotor satisfied the relationship: $Wt/Pitch$ is greater or equal .45 and $Wt/Pitch$ is lesser or equal .8" while the specification and Fig. 10 described the above relationship is for the stator.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 1-3, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai et al. (Patent no. 6,274,960)

Regarding claim 1, Sakai et al. disclose a permanent magnet type reluctance electric motor comprising: a stator (1 in Fig. 2) including a stator iron core and having armature coils (2) placed inside slots; and a rotor provided with a plurality of magnetic barriers formed by cavities and placed on an inner side of the rotor in such a manner that sections where a magnetic flux can easily pass (d-axis) and sections where a magnetic flux cannot easily pass (q-axis) are alternately formed (Fig. 3,4 and Col.18, lines 5-18), and made of a rotor iron core having permanent magnets (6) in cavities. The structure disclosed by Sakai et al. fails to show that rotor satisfying a relationship of $PL/2\pi RW_{qave}$ is greater or equal 130.

Where $W_{qave}(m)$ indicate an average thickness of the rotor iron core on an outer side in a radial direction of the rotor with respect to cavities arranged in a q-axis direction, $L(m)$ indicates a width in a circumferential direction of the cavities, P indicates the number of poles and $R(m)$ indicates the radius of the rotor

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a rotor which satisfies a relationship of $PL/2\pi RW_{qave}$ is greater or equal 130, where $W_{qave} [m]$ indicates an average thickness of the rotor iron core on an outer side in a radial direction of the rotor with respect to cavities arranged in a q-axis direction, $L [m]$ indicates a width in a circumferential direction of the cavities, P indicates the number of poles and $R [m]$ indicates the radius of the rotor. since it has been held that where the general conditions of a claim are disclosed in the prior art,

discovering the optimum or workable ranges involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 2, Sakai et al. disclose the claimed invention except for showing a permanent magnet type reluctance magnet rotor wherein the rotor satisfies the relation ship of $PL/2\pi.RW$ is greater or equal 200. It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a rotor satisfies the relation ship of $PL/2\pi.RW$ is greater or equal 200, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 3, Sakai et al. also disclose a permanent magnet type reluctance magnet rotor wherein the cavities arranged in the q-axis direction are made to go through to an outer circumferential portion in a radial direction of the rotor (Fig. 6) for the purpose of increasing reluctance torque (Col. 20, lines 30-38).

Regarding claim 10 and 11, Sakai et al. disclose the claimed invention except for showing a permanent magnet type reluctance magnet rotor wherein the stator satisfies the relation ship of $Wt/Pitch$ of slot is greater or equal .45 and $Wt/Pitch$ of slots is lesser or equal .8. It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a stator satisfies the relation ship of $Wt/Pitch$ of slot is greater or equal .45 and $Wt/Pitch$ of slots is lesser or equal .8 since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the

optimum or workable ranges involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

4. Claims 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uchida et al.

Regarding claim 4, Uchida et al. disclose a permanent magnet type reluctance electric motor comprising: a stator (26 in Fig. 3) including a stator iron core and having armature coils (30) placed inside slots; and a rotor provided with a plurality of magnetic barriers formed by cavities (22,24,28) and placed on an inner side of the rotor in such a manner that sections where a magnetic flux can easily pass (d-axis) and sections where a magnetic flux cannot easily pass (q-axis) are alternately formed (inherent), and made of a rotor iron core having permanent magnets (4) in cavities.

The structure disclosed by Sakai et al. shows the distance between a cavity arranged in the q-axis direction and a permanent magnet varies in the radial direction but fails to show that rotor satisfies a relationship of $W_{dmin}P/2\pi R$ is greater or equal 65.

Where $W_{dmin}(m)$ indicates a minimum distance between a cavities arrange in the q-axis direction and a permanent magnet, P indicates the number of poles and $R(m)$ indicates the radius of the rotor.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a rotor which satisfies a relationship of $W_{dmin}P/2\pi R$ is greater or equal 65 where $W_{dmin} [m]$ indicates a minimum distance between a cavity arranged in the q-axis direction and a permanent magnet, P indicates the number of

poles and $R[m]$ indicates the radius of the rotor since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 5, It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a rotor which satisfies a relationship of $W_{min}P/2\pi R$ is greater or equal 87 since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 6, Uchida et al. show all of the limitations of the claimed invention except showing the rotor satisfying a relationship of: $W_{ave}P / 2\pi R$ is lesser or equal 160 and $W_{ave}P / 2\pi R$ is greater or equal 95 where $W_{ave} [m]$ indicates an average distance between a cavity arranged in the q-axis direction and a permanent magnet, P indicates the number of poles and $R [m]$ indicates the radius of the rotor.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a rotor which satisfies a relationship of: $W_{ave}P / 2\pi R$ is lesser or equal 160 and $W_{ave}P / 2\pi R$ is greater or equal 95 since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

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Regarding claim 7, It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a rotor which satisfies a relationship of : $W_{daveP} / 2.Pi.R$ is lesser or equal 130 and $W_{daveP} / 2.Pi.R$ is greater or equal 110 since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

5. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai et al. (Patent No. 6,274,960) in view of Sakai (Patent No. 6,087,751)

Regarding claim 8, Sakai et al. (Patent No. 6,274,960) show all limitations of the claimed invention except showing the width in the radial direction of a cavity situated in the q-axis direction is increased towards the center in the q-axis direction.

However, Sakai discloses a reluctance type rotating machine with permanent magnets wherein the width in the radial direction of a cavity situated in the q-axis direction is increased towards the center in the q-axis direction (Fig. 12 and Col. 20, lines 34-47) for the purpose of increasing torque.

Since Sakai et al. and Sakai are in the same field of endeavor, the purpose disclosed by Sakai would have been recognized in the pertinent art of Sakai et al. It would have been obvious at the time the invention was made to a person having an ordinary skill in the art to modify Sakai et al. by forming a rotor wherein the width in the radial direction of a cavity situated in the q-axis direction is increased towards the center in the q-axis direction as taught by Sakai for the purpose of increasing torque.

Regarding claim 9, Sakai also discloses a reluctance type rotating machine with permanent magnets wherein the angle of the permanent magnets is changed so that the distance between a cavity situated in the q-axis direction and a permanent magnet becomes maximum at a position on an inner diameter side of the cavity in the q-axis direction (Fig. 12) for the purpose of increasing torque.

Response to Arguments

6. Applicant's arguments filed on 11/14/02 have been fully considered but they are not persuasive. Applicant's argument is on the ground that "the inventors determined a correlation between the $PL/2\pi \cdot RW_{qave}$ and the torque efficiency and determined that when $PL/2\pi \cdot RW_{qave}$ is greater or equal 130, a torque having 95 percent of maximum torque is achieved and determine these claimed range are critical and that they produce unexpected result". The Examiner respectfully disagrees with the Applicant. The rotor structure disclosed by the present inventors has been known in prior art (Sakai et al.: US 6,274,960, Takabatake et al.: US 6,268,677, Sakai: US 6,087,751 and so on.), in every prior art invention, the dimensions of the cavities and locations of cavities are always optimized to achieve maximum torque efficiency and there is no evidence that prior art torque efficiency is less than 95 percent. Therefore, the present invention does not produce unexpected result when the test data shows in Fig. 5 the best range to achieve 95 percent or more maximum torque. For similar reason, the range disclosed by the present inventors for the stator to satisfy the relation ship of $Wt/Pitch$ of slot is greater or equal .45 and $Wt/Pitch$ of slots is lesser or equal .8 does not produce unexpected result. Therefore, the rejection is still deemed proper.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Information on How to Contact USPTO

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hanh N Nguyen whose telephone number is (703)305-3466. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nestor Ramirez can be reached on (703)308-1371. The fax phone numbers for the organization where this application or proceeding is assigned are (703)305-3431 for regular communications and (703)305-3431 for After Final communications.


Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-1782.

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HNN

January 4, 2003


BURTON S. MULLINS
PRIMARY EXAMINER